



STM and AFM images of 10-fold decagonal AlNiCo quasicrystal (Jeong Young Park et al.)



The tribological properties of adhesion and friction between 10-fold AlNiCo decagonal quasicrystals and sharp conductive W_2C and TiN coated tips were studied in ultra-high vacuum with an STM/AFM. By using the feedback signal of either current or normal force, we imaged the surface in STM (Fig.2) or contact AFM mode (Fig. 4). We found both of adhesion and friction forces decrease as the oxide uptake increases, suggesting the role of oxide as passivating layer on the quasicrystal surface. While the W_2C -quasicrystal contact with air oxide is described by Derjaguin-Muller-Toporov (DMT) model, the contact with chemisorbed oxygen is in the transition regime between JKR and DMT models (See Fig. 3).

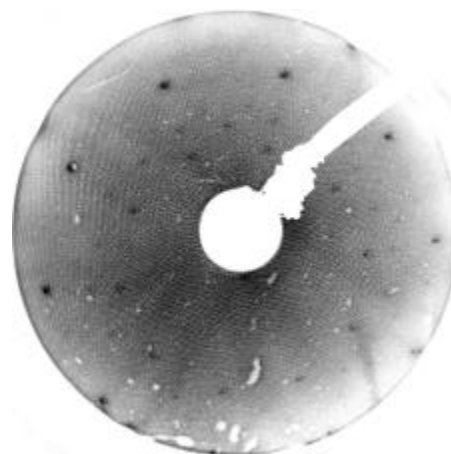


Figure 1. the LEED pattern with two rings of 10-fold spots with satellite spots in between.

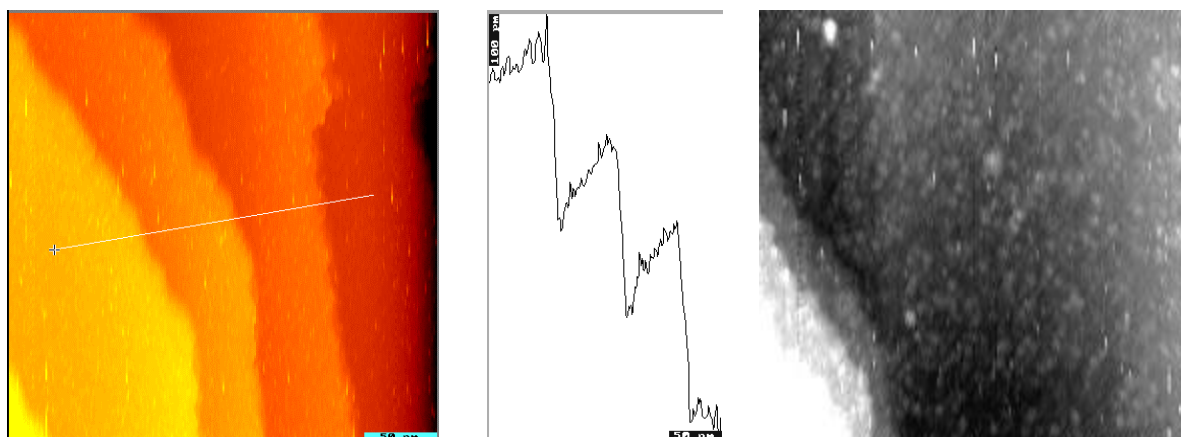


Figure 2. STM image of clean quasicrystal surface shows flat and wide terraces (width : 50~100 nm) separated by steps, and a high resolution image (30nm x 30 nm)

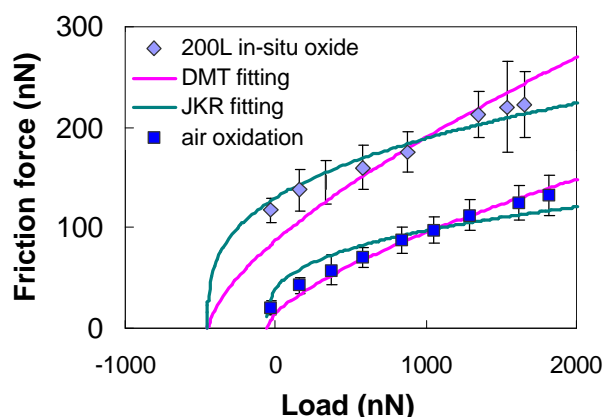


Figure 3. Effect of oxidation on friction forces

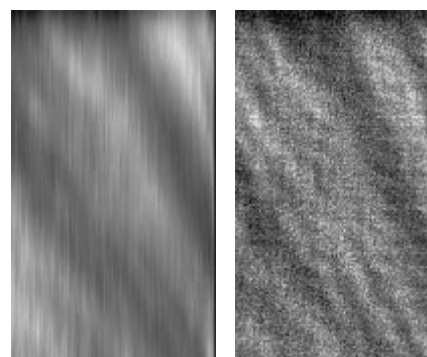


Figure 4. A contact AFM topographical image (left) and a friction image (right) of the ethylene saturated quasicrystal surface with atomic steps (applied load : 178 nN)